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EXHAUST EMISSIONS FROM PASSENGER AUTOMOBILES EQUIPPED WITH DOUGHBOY CARBURETORS

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Environmental Protection Agency
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15. Supplementary Notes

16. Abstracts: Two vehicles were tested using Doughboy carburetors from Doughboy Industries, Inc. One vehicle was a 1970 Chevrolet Impala equipped with a 350 cu. in. V-8 engine, automatic transmission, and air conditioning. It had been driven 15,000 miles and had two experimental carburetors and exhaust gas recirculation. The second vehicle was a 1970 Valiant equipped with a 225 cu. in. six cylinder, automatic transmission, an experimental carburetor, and exhaust gas recirculation. It had been driven 22,000 miles. The following types of tests were conducted on these vehicles: (1) standard 1970 Federal test procedure for exhaust emissions (FTP); (2) closed, constant volume sampling technique using 9 repeats of the 7-mode Federal emissions test cycle (CVS); (3) closed, constant volume sampling technique using the LA4-S3 driving schedule proposed for 1972. Test results for the Valiant indicate that this vehicle failed to meet any of the emission standards set for this year vehicle. Driveability was marginal during the tests. The Chevrolet failed to meet the standards with either carburetor system. Unburned hydrocarbons were considerably reduced when the standard carburetor was installed. The reduction in carbon dioxide with the standard carburetor would indicate improvements in fuel economy of the standard over the Doughboy.

17. Key Words and Document Analysis. 17a. Descriptors

Air pollution
Automobiles
Exhaust emissions
Carburetors
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Sampling
Carbon monoxide
Hydrocarbons
Nitrogen oxides

17b. Identifiers/Open-Ended Terms

Doughboy carburetors
1970 Federal Test Procedure (FTP)
Constant Volume Sampling (CVS)
LA4-S3 Driving Schedule
Driveability

17c. COSATI Field/Group 13B

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Vehicle Tested

Two vehicles, supplied under contract number CPA 22-69-94 to Doughboy Industries, Inc., were tested using the Doughboy carburetors. One vehicle was a 1970 Chevrolet Impala equipped with a 350 cubic inch V-8 engine and automatic transmission. This vehicle also had air conditioning and had been driven 15,000 miles. This vehicle was equipped with two experimental carburetors and exhaust gas recirculation.

The second vehicle was a 1970 Valiant equipped with a 225 cubic inch six cylinder and automatic transmission. This vehicle was equipped with an experimental carburetor and exhaust gas recirculation and had been driven about 22,000 miles.

Tests Conducted

The following types of tests were conducted on these vehicles:

1. Standard 1970 Federal test procedure for exhaust emissions (FTP).

2. Closed, constant volume sampling technique using 9 repeats of the 7-mode Federal emissions test cycle (CVS).

3. Closed, constant volume sampling technique using the LA4-S3 driving schedule as proposed for 1972 and later testing (LA4).

The Valiant was tested eight times over 75 miles. The Chevrolet was tested four times with the carburetors installed and four times with the stock system in place.

Closed cycle data were taken using a constant volume sampling technique. Bag samples were analyzed using non-dispersive infrared analysis for carbon monoxide, flame ionization detector for hydrocarbons and the Whittaker "NOx Box" for oxides of nitrogen. During the 1970 tests oxides of nitrogen were analyzed with non-dispersive infrared analyzers.

Emissions Results

The tests from the Valiant are averaged in Table 1. This vehicle failed to meet any of the emission standards set for this year vehicle. Driveability of this vehicle was marginal during the tests.

The tests on the Chevrolet are averaged in Table 2. The vehicle failed to meet the standards with either carburetor system. Unburned hydrocarbons were considerably reduced when the standard carburetor was installed. The reduction in carbon dioxide with the standard carburetor would indicate improvements in fuel economy of the standard over the Doughboy.

Conclusions

There is a considerable amount of work necessary in order to optimize the Doughboy carburetion for low emissions or to equal the standard engine.

TABLE 1

Doughboy Valiant Test Data

	LA4*	CVS	FTP**
Hydrocarbons	4.5	4.5	4.6
Carbon Monoxide	83	49	57
Carbon Dioxide	468	469	---
Oxides of Nitrogen	3.9	3.7	3.0

All results are reported in grams per mile (gpm).

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* The 1972 emission standards are HC = 3.4 gpm, CO= 39 gpm.

** The 1970 emission standards are HC = 2.2 gpm, CO = 23 gpm.

TABLE 2

Doughboy Chevrolet Test Data

	LA4*	CVS	FTP**
Carburetors Installed			
Hydrocarbons	6.8	6.0	3.8
Carbon Monoxide	60	---	60
Carbon Dioxide	650	676	---
Oxides of Nitrogen	2.8	4.0	2.8
Vehicle Returned to Stock			
Hydrocarbons	3.8	3.8	2.4
Carbon Monoxide	67	62	47
Carbon Dioxide	547	528	---
Oxides of Nitrogen	4.0	4.5	3.8

All results reported in grams per mile (gpm)

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* 1972 standards HC = 3.4 gpm, CO = 39 gpm.

** 1970 standards HC = 2.2 gpm, CO = 23 gpm.